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ABSTRACT

This digest reviews the promise and drawbacks of computerized learning programs and telecommunication technologies for small rural schools. A critical feature of programmed learning packages can be their stand-alone feature. To the extent that such programs do not require the presence or involvement of a trained on-site teacher, they make it relatively easy to enlarge curricular offerings in small rural schools. Discussion also considers two-way interactive instructional television programs which make it possible to join geographically separated students and teachers. This digest describes an ideal situation in which teachers trained as generalists, managers of instructional resources, use stand-alone computer and television programs to provide detailed subject matter expertise. Realization of this ideal hinges on the ability of the teachers and the quality and nature of their training. Thus, substantial changes would have to occur in how teachers in small rural schools are trained. It is concluded that, although the potential to solve small rural schools' curriculum problems is evident, questions about teacher training and development of instructional programs that substitute for on-site teacher expertise remain. Contains 10 references. (DHP)

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ERIC DIGEST

Clearinghouse on Rural Education and Small Schools April 1989

Using Technology to Improve the Curriculum of Small Rural Schools

Digest EDO-RC-89-5

DEVELOPMENTS in two types of technology have important implications for curriculum and instruction in small rural schools. While both of these technologies are rich in promise for those interested in improving the curriculum in small rural schools, there are drawbacks as well.

This Digest reviews the promise as well as the drawbacks. It makes the argument that the most attractive applications involve combinations of the two types of technology in ways that depart significantly from traditional thinking about the delivery of instruction and the role played by on-site (sometimes called "proximate") teachers (see, for example, Cuban, 1986).

The two technologies involve microcomputers and distance education technologies. On the one hand, microcomputers are becoming a more familiar part of the educational landscape, and teachers are using programmed instructional materials more and more frequently. On the other hand, improvements in telecommunications make it increasingly easy to transmit instructionally useful images and sound over geographically forbidding distances.

Computerized learning programs

A critical feature of programmed learning packages, computerized or otherwise, can be their "stand-alone" feature (Levin & Meister, 1985). Stand-alone programs are completely self-contained in the sense that they do not require the presence or involvement of an on-site teacher. To the extent that effective stand-alone programs become available, it will be relatively easy to enlarge curricular offerings in small rural as well as in other kinds of schools.

Important questions concern whether or not stand-alone programs really are possible, desirable, cost-effective, or feasible.

In fact, it is not yet clear if the market for the kinds of stand-alone programs desired by small schools will be sufficiently large, even under the most favorable circumstances, to prompt their development (Carnoy, Daley, & Loop, 1986). Students may learn more thanks to the innovation, but unless the programs have a stand-alone quality they will not enhance the ability of small rural schools to enlarge and broaden their curricular offerings. Indeed, Walker (1983, p. 107) concluded that microcomputers would actually add to, rather than reduce, the costs of education.

If programmed instruction merely supplements on-site teaching resources (that is, if programmed materials with stand-alone qualities cannot be developed and widely used), their potential for making small rural schools more viable will be minimal. New course offerings will require additional teachers with subject matter expertise, just as is currently the case. And no teaching resources will be freed for other uses thanks to the arrival of programmed materials (Monk, 1989).

On the other hand, a simplistic view of what is required will not serve development well. The requirement for an on-site teacher is not an all-or-nothing matter. It is not so much a question of whether programmed instruction can succeed without any involvement of an on-site teacher as it is a question about the kind of skills and experience the on-site teacher will need to have. If learning programs can be developed which **reduce**, but do not eliminate the level of subject matter expertise required of on-site teachers, then there can still be considerable potential for improved curriculum and instruction in small rural schools. The possibilities for such improvement are enhanced if the use of programmed materials with some stand-alone qualities are coupled with use of the evolving distance technologies discussed in the next section.

Telecommunication technologies

Educators in the United States are currently showing great interest in two-way interactive instructional television and its potential for expanding the curriculum of small rural schools. Moreover, the range of technological options has been steadily increasing. It seems reasonable to expect this trend to continue. Numerous technologies, not just two-way interactive instructional television, make it possible to join geographically separated students and teachers, short of relying on daily transportation to increase proximate enrollment levels. Schools and classes can—and have increasingly—been linked together through the use of telephone lines, cables, and radio and television waves of various kinds (Barker, 1987; Batey & Cowell, 1986).

Even if distance technologies do become more sophisticated, more reliable, and less costly, important additional barriers must still be overcome. As Galvin (1986) demonstrated, schools using distance technologies to share programs must solve numerous problems. These problems range from the trivial (for example, agreeing on a common time for a class to be offered) to the more substantive (for example, achieving a stable balance in which each participating school feels like it is contributing to the shared enterprise). These are organizational or, in a sense, "political" problems, but they are at least as important as the technological problems (Batey & Cowell, 1986). The most important of the substantive problems, however, may be teacher training; That problem will be examined after an examination of what a productive combination of stand-alone programmed materials and distance technology might look like.

Toward a productive combination

Distance technologies, when they are coupled with the programmed materials described above, seem to offer **considerable** potential for small rural schools that are interested in improving their curriculum (Hobbs, 1985). To help readers imagine this potential more clearly, the discussion that follows develops an **idealized** example of how these two technologies might be fruitfully combined. Without some such vision, however, the research and development

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necessary to help move educational practice toward this potential is not likely to occur.

What might be possible? Consider a school with 25 students at each of four grade levels, 9-12. Assume the school is located in a rural and isolated area, is separately organized, and is governed by its own elected school board. The school employs four teachers and thereby has a teacher to pupil ratio that is unusually low for a small rural high school striving to offer a rich and specialized curriculum.

The four teachers in this school have been specially trained. They are generalists in the sense that their training placed emphasis on breadth rather than depth of academic and professional training. In fact their professional training has taught them to be managers of instructional resources, a form of training not unlike that provided to librarians.

These teachers understand the nature of how students learn different subjects. They can help students learn a wide range of subjects, including foreign languages, mathematics, science, literature, history, and geography. They do not have deep knowledge of each subject, however. Rather, they know where and how to access such knowledge and they know how to share it with their students.

Moreover, the classrooms have been equipped so that the necessary detailed subject matter expertise is **readily** at hand. One source is the stand-alone programmed materials described above. In addition, these teachers use programs that do draw upon their academic expertise, but which also require ready access to other resources. These other resources might take the form of a consultant on retainer who is hired to respond to calls (via telephone or television) or who might make periodic visits to the site (Wall, 1985). The outside consultant and the on-site teacher work together, developing the curriculum, managing the instructional process, and assessing student progress. Some teachers in this setting—depending on their skills, experience, and professional responsibilities—work with several consultants, each dealing with a separate subject.

Thanks to telephone and data transmission lines, there are additional strategies and techniques to deliver instruction. For example, two-way television makes it possible for students in this isolated rural setting to join classes taking place elsewhere. The on-site teacher provides day-to-day supervision and manages contact with the instructor at a distant site. Students have the opportunity to interact directly with the outside instructor as well as with classmates from other different sites, all of which are in voice and visual communication with one another.

This scenario is admittedly idealized. Although it holds open the possibility of dramatically enhanced curricular offerings in small rural schools, its realization probably hinges on the ability of the teachers and the quality and nature of their training. It is no small undertaking to become an academic generalist, to understand how learning takes place in a variety of fields, to stay informed about the resource base, and to become an effective manager of instruction in the hypothetical school described above.

If educators concerned with small rural schools are interested in realizing this vision (and there is ample evidence that they are), then **substantial** changes must occur in how teachers in small rural schools are trained. As a result, the academic qualities expected of both educators and their students might be expected to rise. The combined effect of changes in teacher training, technologies, and classroom instruction could well cause the number of teachers employed in small rural schools to fall, at least as compared to present norms.

Conclusions

It seems clear that the greatest promise attends combinations of technologies in nontraditional forms of instruction. And yet, there are a disquieting number of unanswered questions. For example, it is largely unknown how successful the new conception of a generalist teacher might be. It is also unclear how possible it will be to develop instructional programs that can substitute to some degree for on-site teacher subject matter expertise.

Although the seriousness of these questions highlights the dangers of viewing technology as an easy and readily available means of solving small rural schools' curriculum problems (Cuban, 1986), the potential is self-evident, and the direction for future research and development efforts seems clear.

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